

**Amendment and Response under 37 C.F.R. 1.116**

Applicant: Xiang Dai et al.

Serial No.: 10/612,663

Filed: July 2, 2003

Docket No.: 200308566-1

Title: SUPPORTING A CIRCUIT PACKAGE INCLUDING SUBSTRATE HAVING A SOLDER COLUMN ARRAY

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**REMARKS**

The following remarks are made in response to the Final Office Action mailed October 31, 2006. Claims 8, 10, 14-16, 21, 23 and 25-29 were rejected. Claim 13 has been objected to. With this Response, claims 8, 10, 14, 21, 23, and 28 have been amended, claims 15-16 and 26-27 are canceled without prejudice and new claims 30-35 have been added. Claims 8, 10, 13-14, 21, 23, 25, and 28-35 are pending in the application and are presented for reconsideration and allowance.

**Claim Objection**

In the Office Action, claims 15, 16, 26, and 27 were objected to as being in violation of M.P.E.P 2181 for using means language modified by "sufficient structure" and "acts for achieving the specific function".

Applicants have canceled claims 15-16 and 26-27 without prejudice.

**Claim Rejections under 35 U.S.C. § 103**

In the Office Action, claims 8, 10, 14-16, 21, 23, 25-29 were rejected under 35 U.S.C. 103(a) as being unpatentable over Cromwell US Patent No. 6,198,630 (herein the Cromwell Patent) in combination with Dawson et al. US Patent No. 5,261,615 (herein the Dawson Patent).

**Applicants' Independent Claim 8**

First, Applicant's amended independent claim 8 includes the limitation of a plurality of supports that are separate and distinct from each other with the respective supports disposed directly on a printed circuit board and spaced apart from each other to position each respective support at the respective corners of the integrated circuit package.

In contrast, the Cromwell Patent discloses an electromagnetic interference frame 110 surrounding a VLSI module 102 for providing a Faraday cage 117 about the VLSI module 102 to attenuate electromagnetic interference from the VLSI module 102. See the Cromwell Patent at Column 4, lines 1-8. As illustrated in Figures 1A-1B, 2A-2D, 2F, 3A, 4A-4B of the Cromwell Patent, electromagnetic interference frame 110 forms a single, uninterrupted

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member arranged in a generally rectangular shape to enable the electromagnetic interference frame 110 to circumscribe the VLSI module 102.

In fact, the Cromwell Patent teaches away from Applicants' claim 8 because any attempt to modify the electromagnetic interference frame 110 into separate, distinct supports that are spaced apart from each other, as claimed by Applicant, would destroy the Faraday cage 117 and the express purpose of the electromagnetic interference frame 110.

Consequently, there is no suggestion in the Cromwell Patent of dividing up the electromagnetic interference frame 110 into separate parts. Moreover, additional passages in the Cromwell Patent also teach that gasket 116, in combination with electromagnetic interference frame 110, acts to maintain a seal of the Faraday cage 117 about the VLSI module 102 to attenuate the electromagnetic interference generated by the VLSI module 102. See the Cromwell Patent at Column 4, lines 1-25; Column 5, lines 40-50; and Column 10, lines 3-5.

Accordingly, the Cromwell Patent teaches away from Applicants' independent claim 8, which includes the limitation of a plurality of supports that are distinct and separate from each other and disposed on the printed circuit board with the respective supports being spaced apart from each other to position each respective support at the respective corners of the integrated circuit package.

Second, Applicant's amended independent claim 8 also includes the limitation that each (separate, distinct) support comprises a body and a pair of wings extending generally perpendicular to the body. The wings of the support(s) extend underneath the extended portion of the lid of the integrated circuit package and the body of the support(s) extends outwardly in a generally opposite direction from the wings. The wings of the support(s) contact and provide vertical support to the extended portion of the lid of the integrated circuit package without surrounding the integrated circuit package, thereby minimizing the footprint of the supports on the printed circuit board about the periphery of the integrated circuit package. Moreover, the body of the support(s) enables securing the support relative to the printed circuit board via a fastener at a location spaced away from the periphery of the integrated circuit package. See Applicant's specification at page 5, lines 18-22 and Figures 2-5.

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In contrast, in the Cromwell Patent the electromagnetic interference frame 110 completely surrounds the VLSI module 102 (as described above), and therefore occupies a large footprint about VLSI module.

Third, Applicants' amended independent claim 8 claims an assembled electronic component system and includes the limitation of an integrated circuit package including a substrate and a lid, wherein the substrate includes a solder column array of the substrate directly connected to the printed circuit board.

In contrast, the Cromwell Patent discloses a VLSI module 102 connected to circuit board 108 via interposer socket assembly 106, which is sandwiched between land grid array 101 of the VLSI module 102 and the land grid array 101 of the circuit board 108. See the Figures 1A-1B of the Cromwell Patent, and Column 4, lines 26-246. Applicants' amended independent claim 8 includes no structure corresponding to interposer socket assembly 106 because in Applicants' independent claim 8 the solder column array of the substrate of the integrated circuit package is directly connected to the printed circuit board. Accordingly, the Cromwell Patent again teaches away from Applicants' independent claim 8.

Fourth, Applicants' amended independent claim 8 includes the limitation of an integrated circuit package including: (1) the lid directly extending from the substrate with the lid also including an extended portion that extends directly from the substrate outwardly over an edge of the substrate; and (2) the wing portions of each separate support extending underneath the extended portion of the lid of the integrated circuit package at the corners of the integrated circuit package.

In the Cromwell Patent, the heat sink 120 (including its heat sink base 121) is an element that is completely separate and distinct from VLSI module 102, as illustrated in Figures 1A-1B. Moreover, because electromagnetic interference frame 110 completely surrounds VLSI module 102 to contain electromagnetic interference from VLSI module 110, no portion of VLSI module 102 extends vertically above or laterally outside of electromagnetic interference frame 110, as apparently illustrated in Figure 2C of the Cromwell Patent.

Accordingly, in the Cromwell Patent, the electromagnetic interference frame 110 does not extend underneath any portion of VLSI module 102. This arrangement in the Cromwell Patent is unlike Applicants' claim 8 in which the wing portions of each separate support

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extends underneath the extended portion of the lid of the integrated circuit package at the corners of the integrated circuit package. Moreover, without a portion of VLSI module 102 extending outside of electromagnetic interference frame 110, the electromagnetic interference frame 110 cannot provide any vertical support to the VLSI module 102.

Consequently, the Cromwell Patent further teaches away from Applicants' independent claim 8.

Fifth, Applicants' amended independent claim 8 includes the limitation that the heat sink is separate and independent of the lid of the integrated circuit package with the heat sink being removably secured onto the lid of the integrated circuit package via a compressive force, as well as including the limitation that the wings of the support are in contact with the extended portion of the lid of the integrated circuit package as the wings of the support extend underneath the extended portion of the lid of the integrated circuit package.

In contrast, in the Cromwell Patent teaches just the opposite arrangement in which, "heat sink base 121 is formed in the shape of a pedestal that creates a gap between the heat sink 120 and the electromagnetic interference frame 110 . . . therefore the load created by the tightened heat sink screw 124 and the heat sink 120 does not rest on the electromagnetic interference frame 110 (emphasis added). See the Cromwell Patent at Column 7, lines 12-18 and at lines 10-11. Moreover, as previously explained regarding the Cromwell Patent, no portion of the VLSI module 102 extends outside of or over electromagnetic interference frame 110. Accordingly, no portion of either VLSI module 102 or heat sink 120 (or its base 121) is in contact with a top portion of electromagnetic interference frame 110 in a manner in which electromagnetic interference frame 110 supports a compressive load from clamp 122 and heat sink screw 124. Accordingly, to the extent that the assertion in the Office Action is maintained that the heat sink base 121 is a "lid", the Cromwell Patent again teaches away from Applicants' independent claim 8 (in which the wings of the support(s) are in contact with and vertically support the lid of the integrated circuit package).

Accordingly, the Cromwell Patent discloses numerous deficiencies relative to Applicants' independent claim 8.

In the Office Action, the Dawson Patent was asserted to cure the deficiencies of the Cromwell Patent. However, the information provided to identify the Dawson Patent appears to be in error. Applicants' attorney spoke with the Examiner during the week of December

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18, 2006 regarding "Dawson U.S. Patent 5, 261,615" and requested a clarification of the identity of the reference intended to be cited because it appears that "Dawson U.S. Patent 5,261,615" is not an actual reference. Applicants have reviewed the file history including both Forms PTO-1449 (cited by Applicants) and Forms PTO-892 (cited by Examiner) to search for the "Dawson Patent". However, no listed reference appeared to correspond with either the name Dawson or with the Patent Number 5,261,615.

Applicants' attorney spoke again with the Examiner via telephone on Wednesday December 27, 2006 regarding the "Dawson Patent". It was agreed that Applicants would submit their Response despite the situation with the "Dawson Patent", based on Applicants' belief that Applicants' claims were sufficiently distinguishable over the primary reference (the Cromwell Patent) that the "Dawson Patent" would not be able to cure the deficiencies of the Cromwell Patent. The Examiner further indicated that the next Office Action would be a non-final Office Action in light of the situation with the Dawson Patent and in light of Applicants willingness to proceed in responding to the Office Action.

To this end, it appears that the Dawson Patent was cited in the Office Action in an attempt to cure a deficiency in the Cromwell Patent regarding the lid and the heat sink. Accordingly, because the Cromwell Patent fails to teach or suggest several different limitations of Applicants' claims besides the limitations regarding the lid and the heat sink, Applicants' respectfully submit that the "Dawson Patent" would likely fail to cure the many deficiencies of the Cromwell Patent regarding Applicants claims.

For these reasons, one cannot combine the Cromwell Patent and the Dawson Patent to arrive at Applicants' independent claim 8 and therefore, Applicants respectfully submit that the Cromwell Patent and the Dawson Patent, alone or in combination, fail to teach or suggest Applicants' amended independent claim 8. Dependent claims 10, 14, 21, 23, and 25 are also believed to be allowable as they further define patentably distinct independent claim 8.

**Applicants' Independent Claim 15**

Applicants have canceled independent claim 15, as well as claims 16 and 26-27 depending therefrom, without prejudice.

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**Applicants' Independent Claim 28**

First, Applicant's amended independent claim 28 includes the limitation of a plurality of supports that are separate and distinct from each other with the respective supports disposed directly on a printed circuit board and spaced apart from each other to position each respective support at the respective corners of the integrated circuit package.

In contrast, the Cromwell Patent discloses an electromagnetic interference frame 110 surrounding a VLSI module 102 for providing a Faraday cage 117 about the VLSI module 102 to attenuate electromagnetic interference from the VLSI module 102. See the Cromwell Patent at Column 4, lines 1-8. As illustrated in Figures 1A-1B, 2A-2D, 2F, 3A, 4A-4B of the Cromwell Patent, electromagnetic interference frame 110 forms a single, uninterrupted member arranged in a generally rectangular shape to enable the electromagnetic interference frame 110 to circumscribe the VLSI module 102.

In fact, the Cromwell Patent teaches away from Applicants' claim 28 because any attempt to modify the electromagnetic interference frame 110 into separate, distinct supports that are spaced apart from each other, as claimed by Applicant, would destroy the Faraday cage 117 and the express purpose of the electromagnetic interference frame 110.

Consequently, there is no suggestion in the Cromwell Patent of dividing up the electromagnetic interference frame 110 into separate parts. Moreover, additional passages in the Cromwell Patent also teach that gasket 116, in combination with electromagnetic interference frame 110, acts to maintain a seal of the Faraday cage 117 about the VLSI module 102 to attenuate the electromagnetic interference generated by the VLSI module 102. See the Cromwell Patent at Column 4, lines 1-25; Column 5, lines 40-50; and Column 10, lines 3-5.

Accordingly, the Cromwell Patent teaches away from Applicants' independent claim 28, which includes the limitation of a plurality of supports that are distinct and separate from each other and disposed on the printed circuit board with the respective supports being spaced apart from each other to position each respective support at the respective corners of the integrated circuit package.

Second, Applicant's amended independent claim 28 also includes the limitation that each (separate, distinct) support comprises a pair of wings extending generally perpendicular

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to each other and a corner. The wing portions of the respective supports extend underneath the extended portion of the lid of the integrated circuit package. The wing portions of the respective supports provide vertical support to the extended portion of the lid of the integrated circuit package without surrounding the integrated circuit package, thereby minimizing the footprint of the supports on the printed circuit board about the periphery of the integrated circuit package. The wing portions of the respective supports are removably secured relative to the integrated circuit package via a band applying a lateral force against the supports.

In contrast, in the Cromwell Patent, the electromagnetic interference frame 110 completely surrounds the VLSI module 102 (as described above), and therefore occupies a large footprint about VLSI module, and fails to include the combination of a plurality of separate and distinct supports that are spaced from each other and held in position via a band, as claimed by Applicants in claim 28.

Accordingly, the Cromwell Patent again teaches away from Applicants' independent claim 28.

Third, Applicants' amended independent claim 28 claims an assembled electronic component system and includes the limitation of an integrated circuit package including a substrate and a lid, wherein the substrate includes a solder column array of the substrate directly connected to the printed circuit board.

In contrast, the Cromwell Patent discloses a VLSI module 102 connected to circuit board 108 via interposer socket assembly 106, which is sandwiched between land grid array 101 of the VLSI module 102 and the land grid array 101 of the circuit board 108. See the Figures 1A-1B of the Cromwell Patent, and Column 4, lines 26-246. Applicants' amended independent claim 8 includes no structure corresponding to interposer socket assembly 106 because in Applicants' independent claim 8 the solder column array of the substrate of the integrated circuit package is directly connected to the printed circuit board. Accordingly, the Cromwell Patent again teaches away from Applicants' independent claim 28.

Fourth, Applicants' amended independent claim 28 includes the limitation of an integrated circuit package including: (1) the lid directly extending from the substrate with the lid also including an extended portion that extends directly from the substrate outwardly over an edge of the substrate; and (2) the wing portions of each separate support extending

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underneath the extended portion of the lid of the integrated circuit package at the corners of the integrated circuit package .

In the Cromwell Patent, the heat sink 120 (including its heat sink base 121) is an element that is completely separate and distinct from VLSI module 102, as illustrated in Figures 1A-1B. Moreover, because electromagnetic interference frame 110 completely surrounds VLSI module 102 to contain electromagnetic interference from VLSI module 110, no portion of VSLI module 102 extends vertically above or laterally outside of electromagnetic interference frame 110 as apparently illustrated in Figure 2C of the Cromwell Patent.

Accordingly, in the Cromwell Patent, the electromagnetic interference frame 110 does not extend underneath any portion of VLSI module 102. This arrangement in the Cromwell Patent is unlike Applicants' claim 8 in which the wing portions of each separate support extends underneath the extended portion of the lid of the integrated circuit package at the corners of the integrated circuit package. Moreover, without a portion of VLSI module 102 extending outside of electromagnetic interference frame 110, the electromagnetic interference frame 110 cannot provide any vertical support to the VLSI module 102.

Consequently, the Cromwell Patent further teaches away from Applicants' independent claim 28.

Fifth, Applicants' amended independent claim 28 includes the limitation that the heat sink is separate and independent of the lid of the integrated circuit package with the heat sink being removably secured onto the lid of the integrated circuit package via a compressive force, as well as including the limitation that the wing portions of the respective supports are in contact with the extended portion of the lid of the integrated circuit package, as the wings of the support extend underneath the extended portion of the lid of the integrated circuit package.

In contrast, in the Cromwell Patent teaches just the opposite arrangement in which, "heat sink base 121 is formed in the shape of a pedestal that creates a gap between the heat sink 120 and the electromagnetic interference frame 110 . . . therefore the load created by the tightened heat sink screw 124 and the heat sink 120 does not rest on the electromagnetic interference frame 110 (emphasis added). See the Cromwell Patent at Column 7, lines 12-18 and at lines 10-11. Moreover, as previously explained regarding the Cromwell Patent, no

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portion of the VLSI module 102 extends outside of or over electromagnetic interference frame 110. Accordingly, no portion of either VLSI module 102 or heat sink 120 (or its base 121) is in contact with a top portion of electromagnetic interference frame 110 in a manner in which electromagnetic interference frame 110 supports a compressive load from clamp 122 and heat sink screw 124. Accordingly, to the extent that the assertion in the Office Action is maintained that the heat sink base 121 is a "lid", the Cromwell Patent again teaches away from Applicants' independent claim 28 (in which the wings of the support(s) are in contact with and vertically support the lid of the integrated circuit package).

Accordingly, the Cromwell Patent discloses numerous deficiencies relative to Applicants' independent claim 28.

Applicants note the comments previously presented in association with Applicants' independent claim 8 regarding the treatment of the Dawson Patent.

For these reasons, one cannot combine the Cromwell Patent and the Dawson Patent to arrive at Applicants' independent claim 28 and therefore, Applicants respectfully submit that the Cromwell Patent and the Dawson Patent, alone or in combination, fail to teach or suggest Applicants' amended independent claim 28. Dependent claims 29 is also believed to be allowable as it further defines patentably distinct independent claim 28.

In view of the above, Applicants respectfully request that the above 35 U.S.C. §103 rejections be removed and that claims 8, 10, 14, 21, 23, 25 and 28-29 be allowed.

**Allowable Subject Matter**

In the Office Action, claim 13 was objected to for being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all limitations of the base claim and any intervening claims and if rewritten to overcome the 35 U.S.C. §112 rejections. Applicants respectfully acknowledge the indication of allowable subject matter. However, as dependent claim 13 further defines patentability distinct independent claim 8. Applicants respectfully request allowance of claim 8 in dependent form.

**New Claims 30-35**

Applicants have also presented new claims 30-35 directed to an assembled electronic component system. Applicants respectfully submit that new dependent claims 30-31, new independent claim 32 with claims 32-35 depending therefrom, are patentable over the art of

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record for at least reasons patentability consistent with the reasoning presented above in favor of the patentability of claims 8, 10, 13-14, 21, 23, 25, and 28-29. Accordingly, Applicants respectfully request favorable consideration and allowance of new claims 30-35.

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**CONCLUSION**

In view of the above, Applicant respectfully submits that pending claims 8, 10, 13-14, 21, 23, 25, and 28-35 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 8, 10, 13-14, 21, 23, 25, and 28-35 is respectfully requested.

No fees are required under 37 C.F.R. 1.16(h)(i). However, if such fees are required, the Patent Office is hereby authorized to charge Deposit Account No. 08-2025.

The Examiner is invited to contact the Applicant's representative at the below-listed telephone numbers to facilitate prosecution of this application.

Any inquiry regarding this Amendment and Response should be directed to either David A. Plettner at Telephone No. (408) 447-3013, Facsimile No. (408) 447-0854 or Paul S. Grunzweig at Telephone No. (612) 767-2504, Facsimile No. (612) 573-2000. In addition, all correspondence should continue to be directed to the following address:

IP Administration  
Legal Department, M/S 35  
HEWLETT-PACKARD COMPANY  
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**CERTIFICATE OF FACSIMILE TRANSMISSION**

The undersigned hereby certifies that this paper or papers, as described herein, are being transmitted by facsimile to the U.S. Patent and Trademark Office, Fax No. (571) 273-8300 on this 2nd day of January, 2007.

By Paul S. Grunzweig  
Name: Paul S. Grunzweig